LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (original) A crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling said hydrocarbon feedstock in at least one refrigerated crystallization stage that is indirectly refrigerated by evaporating at least a portion of a substantially liquid stream comprising ammonia.

2. (original) The process of Claim 1 wherein said substantially hydrocarbon feedstock comprises hydrocarbons consisting essentially of ethylbenzene, paraxylene, metaxylene, orthoxylene, and hydrocarbon impurities.

3. (original) The process of Claim 1 wherein said substantially hydrocarbon feedstock comprises a low paraxylene concentration of less than about 50 weight percent paraxylene.

4. (original) The process of Claim 1 wherein said substantially hydrocarbon feedstock comprises a low paraxylene concentration of less than about 30 weight percent paraxylene.

5. (original) The process of Claim 1 wherein said substantially hydrocarbon feedstock comprises a high paraxylene concentration of at least about 50 weight percent paraxylene.

6. (original) The process of Claim 1 wherein said substantially hydrocarbon feedstock comprises a high paraxylene concentration of at least about 70 weight percent paraxylene.

7. (original) The process of Claim 1 wherein at least one crystallization stage is cooled by heat exchange with an ethylene refrigerant, wherein said ethylene refrigerant has been cooled with a stream comprising ammonia.

8. (original) The process of Claim 1 wherein said at least one crystallization stage removes from said hydrocarbon feedstock a stream of at least 70 weight percent paraxylene, further wherein said process produces a final, paraxylene product.

9. (original) The process of Claim 1 wherein said at least one crystallization stage is refrigerated by:

   a. evaporating at least a portion of said substantially liquid stream comprising ammonia from enthalpy supplied by a heat source from said crystallization process, and
   b. absorbing said evaporated ammonia from step (a) into a stream comprising a mixture enriched in water relative to ammonia.

10. (original) The process of Claim 1 wherein said indirect refrigeration comprises vaporizing a substantially liquid stream comprising ammonia by transfer of heat from said substantially hydrocarbon feedstock to said substantially liquid stream comprising ammonia.

11. (original) The process of Claim 10 wherein said indirect refrigeration further comprises said substantially liquid stream comprising ammonia not in direct contact with said substantially hydrocarbon feedstock.

12. (original) The process of Claim 10 wherein said indirect refrigeration further comprises said substantially liquid stream comprising ammonia and said substantially hydrocarbon feedstock located on opposite sides of a heat transfer surface.

13. (original) A crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling said hydrocarbon feedstock in at least one crystallization stage cooled by an ethylene refrigerant, wherein said ethylene refrigerant has been cooled by heat exchange with a substantially liquid stream comprising ammonia.

14. (original) The process of Claim 13 wherein said substantially hydrocarbon feedstock comprises hydrocarbons consisting essentially of ethylbenzene, paraxylene, metaxylene, orthoxylene, and hydrocarbon impurities.

15. (original) The process of Claim 13 wherein said substantially hydrocarbon feedstock comprises a paraxylene concentration of less than about 50 weight percent paraxylene.

16. (original) The process of Claim 13 wherein said substantially hydrocarbon feedstock comprises a paraxylene concentration of less than about 30 weight percent paraxylene.

17. (original) The process of Claim 13 wherein said at least one crystallization stage removes from said hydrocarbon feedstock a stream of at least 70 weight percent paraxylene.

18. (original) The process of Claim 17 wherein said stream is slurried at least once and melted to produce a final paraxylene product.

19. (original) A crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling said hydrocarbon feedstock in at least one refrigerated crystallization stage that is indirectly refrigerated by cooling substeps comprising:

a. contacting a stream comprising ammonia vapor with a stream comprising water and forming a liquid mixture comprising water and ammonia,

b. recovering from said liquid mixture comprising water and ammonia a substantially liquid stream comprising ammonia, and

c. vaporizing at least a portion of said substantially liquid stream comprising ammonia by transferring at least a portion of the enthalpy of vaporization to said substantially liquid stream comprising ammonia from said hydrocarbon feedstock.

20. (original) The process of Claim 19 wherein said liquid mixture comprising water and ammonia of step (a) is further recovered as a stream enriched in ammonia relative to water.

21.(original) The process of Claim 20 wherein said stream enriched in ammonia relative to water is directed for fractionation into said substantially liquid stream comprising ammonia and a stream enriched in water relative to ammonia.

22. (currently amended) An ammonia absorption refrigeration process comprising: a. conveying a liquid ammonia stream to an ammonia evaporator to chill and remove process heat from a crystallization process to recover paraxylene; b. sending ammonia vapor to an absorber to generate a strong ammonia aqua solution; c. pumping said strong ammonia aqua solution to an ammonia fractionator; d. reboiling said ammonia fractionator with an enthalpy source to create very pure ammonia vapor and then condensing said very pure ammonia vapor, and

e. vaporizing at least a portion of said condensed ammonia by indirect heat transfer of heat from a hydrocarbon feedstock to said condensed ammonia, wherein said ~~at least one~~ enthalpy source selected from the group consisting of: condensing overhead vapors of distillation towers used to separate products, byproducts, and/or recycle streams of a crystallization process to recover paraxylene; reactor effluent streams of a crystallization process to recover paraxylene; furnace flue gas of a crystallization process to recover paraxylene; steam generated during a crystallization process to recover paraxylene; and warm streams on other chemical or refinery process units located near a paraxylene crystallization process unit.

23. (original) The process of Claim 22 wherein said enthalpy source is provided at a temperature of at least about 200° F.

24. (original) The process of Claim 22 wherein said enthalpy source is provided at a temperature of at least about 250° F.

25. (new) A crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling said hydrocarbon feedstock in at least one refrigerated crystallization stage that is indirectly refrigerated by evaporating at least a portion of a substantially liquid stream comprising ammonia, wherein said hydrocarbon feedstock comprises hydrocarbons consisting essentially of ethylbenzene, paraxylene, metaxylene, orthoxylene, and hydrocarbon impurities, wherein said substantially hydrocarbon feedstock comprises a low paraxylene concentration of less than about 50 weight percent paraxylene or from less than about 30 weight percent paraxylene, a high paraxylene concentration of at least about 50 weight percent paraxylene or of at least about 70 weight percent paraxylene, wherein said at least one refrigerated crystallization stage is indirectly refrigerated by evaporating at least a portion of a substantially liquid stream comprising ammonia from enthalpy

supplied by a heat source from said crystallization process, and wherein said at least one crystallization stage is cooled by heat exchange with an ethylene refrigerant, wherein said ethylene refrigerant has been cooled with a stream comprising ammonia, and absorbing said evaporated ammonia from step (a) into a stream comprising a mixture enriched in water relative to ammonia , and wherein said at least one crystallization stage removes from said hydrocarbon feedstock a stream of at least 70 weight percent paraxylene, further wherein said process produces a final, paraxylene product.